

# Perinatal Health in the Rural United States, 2005

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## Policy Brief Series

#138: LOW BIRTH WEIGHT RATES IN THE RURAL UNITED STATES, 2005

**#139: LOW BIRTH WEIGHT RATES AMONG RACIAL AND ETHNIC GROUPS IN THE RURAL UNITED STATES, 2005**

#140: INADEQUATE PRENATAL CARE IN THE RURAL UNITED STATES, 2005

#141: INADEQUATE PRENATAL CARE AMONG RACIAL AND ETHNIC GROUPS IN THE RURAL UNITED STATES, 2005

These briefs cover the issue of perinatal outcomes in rural areas across the United States in 2005. Low birth weight, a key indicator of the health of the U.S. population, and adequacy of prenatal care, a critical indicator of access and quality of health care, are explored to discover how they are related to rural or urban location, race, and ethnicity.

## Key findings of this brief are:

- Non-Hispanic blacks generally had the highest rural low birth weight rates of all races/ethnicities, regardless of geographic location.
- Non-Hispanic white, Asian/Pacific Islander, and American Indian/Alaska Native rural low birth weight rates followed the national pattern of being highest in the southern states and census divisions, while the highest Hispanic rural low birth weight rate was in the Mountain division.



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# Low Birth Weight Rates Among Racial and Ethnic Groups in the Rural United States, 2005

## BACKGROUND

The WWAMI Rural Health Research Center has documented a nearly threefold difference in rural low birth weight (LBW) rates across states (from 3.69% in Alaska to 10.43% in Louisiana), with the highest rates in southern states and the lowest rates in western, midwestern, and northeastern states.<sup>1</sup> Studies have shown that race/ethnicity also has a powerful association with LBW overall in the United States, with non-Hispanic black women having nearly twice the LBW rate of most other racial and ethnic groups.<sup>2</sup> Whether differences in rural LBW rates are consistent across U.S. racial and ethnic groups is unknown.

## STUDY AIM

To examine the 2005 U.S. LBW rates among rural women of different races and ethnicities at the census-division and state levels.

## STUDY DESIGN

This is a national, cross-sectional analysis of 3,998,753 singleton U.S. births using a special version of the 2005 Period Linked Birth/Infant Death Data Set that included county identifiers. Urban Influence Codes identified births to mothers residing in rural (i.e., non-metropolitan) counties. We defined LBW births using the standard definition of less than 2,500 grams.<sup>3</sup> The Linked Birth/Infant Death Data Set reports maternal Hispanic origin and race separately.<sup>4</sup> Using these variables, we defined infant race/ethnicity as Hispanic, non-Hispanic white, non-Hispanic black or African American, non-Hispanic Asian/Pacific Islander, or non-Hispanic American Indian/Alaska Native. We do not report results for census divisions and states with low numbers of individuals in rural minority racial/ethnic groups (see Appendix 1: Technical Documentation).

## FINDINGS

- In each census division, non-Hispanic blacks had the highest rural LBW rates of all races/ethnicities (Figures 1 through 5 and Appendix 2; LBW rate not calculated for non-Hispanic blacks in New England due to inadequate numbers). In all but two states (Pennsylvania and Iowa, Figure 8), non-Hispanic blacks had rural LBW rates over 8% (roughly the 90th percentile for state rural, all-race LBW rates).
- Consistent with findings for rural births nationally, the highest LBW rates for the rural non-Hispanic white, Asian/Pacific Islander, and American Indian/Alaska Native groups were in the southern census divisions.
- For Hispanic women, the highest rural LBW rate was in the Mountain census division.
- At the state level, rural LBW rates for each racial and ethnic group varied substantially, even within census divisions. Rural LBW rates were high (over 8%) for Hispanic women in New Mexico, for non-Hispanic white women in West Virginia, for non-Hispanic American Indian/Alaska Native women in Texas, North Carolina, and South Carolina, and for non-Hispanic Asian/Pacific Islander women in Texas, Louisiana, South Carolina, Georgia, and Florida. (See Figures 6 through 10; see Appendix 3 for rural low birth weight rates by ethnicity and state.)

## LIMITATIONS

Small numbers of rural births to racial and ethnic minority groups limited the ability to examine their LBW rates in some census divisions and states.

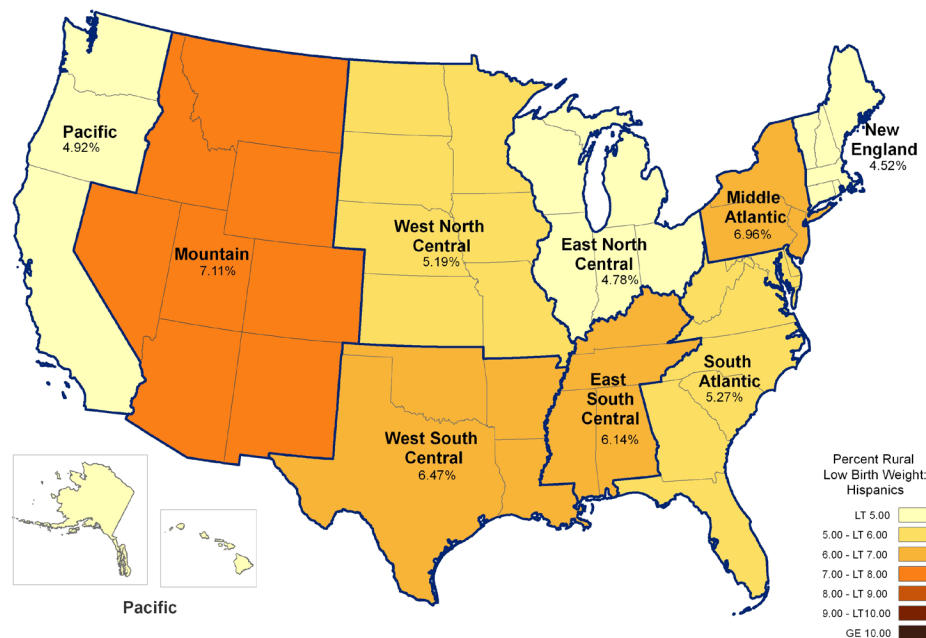
## CONCLUSIONS

Geographic variation in 2005 U.S. rural LBW rates differed by race and ethnicity. Non-Hispanic blacks had consistently high LBW rates, regardless of geographic location. Non-Hispanic white, Asian/Pacific Islander, and American Indian/Alaska Native rural LBW rates followed the national pattern of being highest in the southern states and census divisions, while the highest Hispanic rural LBW rate was in the Mountain division.

## IMPLICATIONS FOR POLICY, DELIVERY, OR PRACTICE

The overall U.S. LBW rate has not decreased despite national efforts over more than two decades to increase access to prenatal care services. There has been a recent call to revise the current model of prenatal care, tailoring prenatal care to address maternal and fetal risk factors so that high-risk patients receive more intensive, and low-risk patients less intensive services.<sup>5</sup> Given the dramatic variation in rural LBW rates by race/ethnicity and geography, prenatal care services and solutions specific to racial/ethnic groups will be needed to decrease the disparities in morbidity and mortality that are associated with LBW. Additional research using a multidisciplinary approach is required to address the complex web of biological, psychological, social, and environmental factors associated with prematurity and LBW among rural racial and ethnic minority groups.<sup>6</sup>

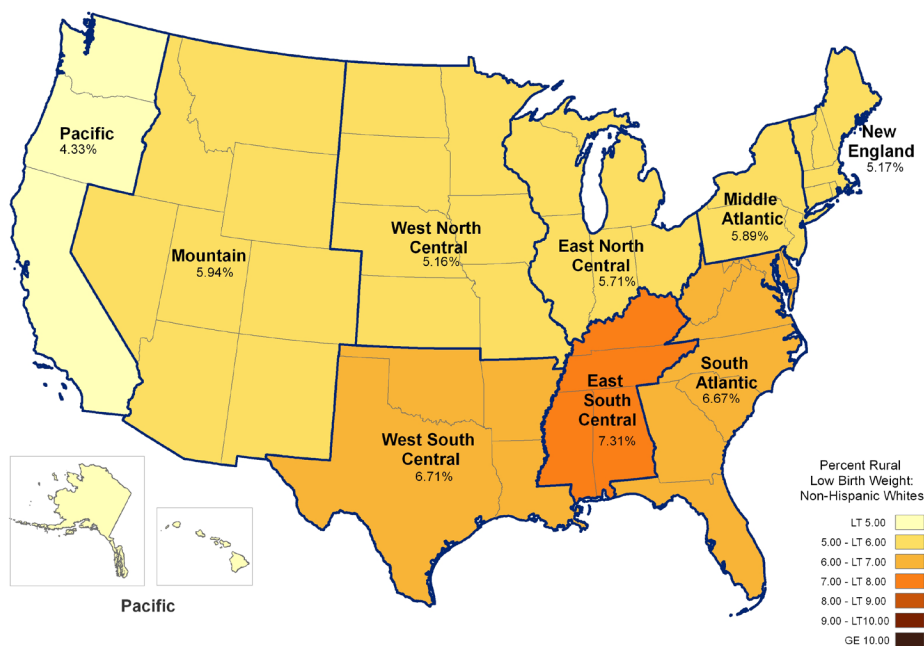
**Figure 1: Rural Low Birth Weight by Census Division for Hispanics, 2005**



Map Date: June 2011  
 Data Sources: 2002 Urban Influence Codes, ERS, USDA;  
 2005 period linked birth infant death data file, NCHS, CDC

2005 national overall (urban and rural) low birth weight rate was 6.43%.

**Figure 2: Rural Low Birth Weight by Census Division for Non-Hispanic Whites, 2005**



Map Date: June 2011  
Data Sources: 2003 Urban Influence Codes, ERS, USDA;  
2005 period linked birth/infant death data file, NCHS, CDC

2005 national overall (urban and rural) low birth weight rate was 6.43%.

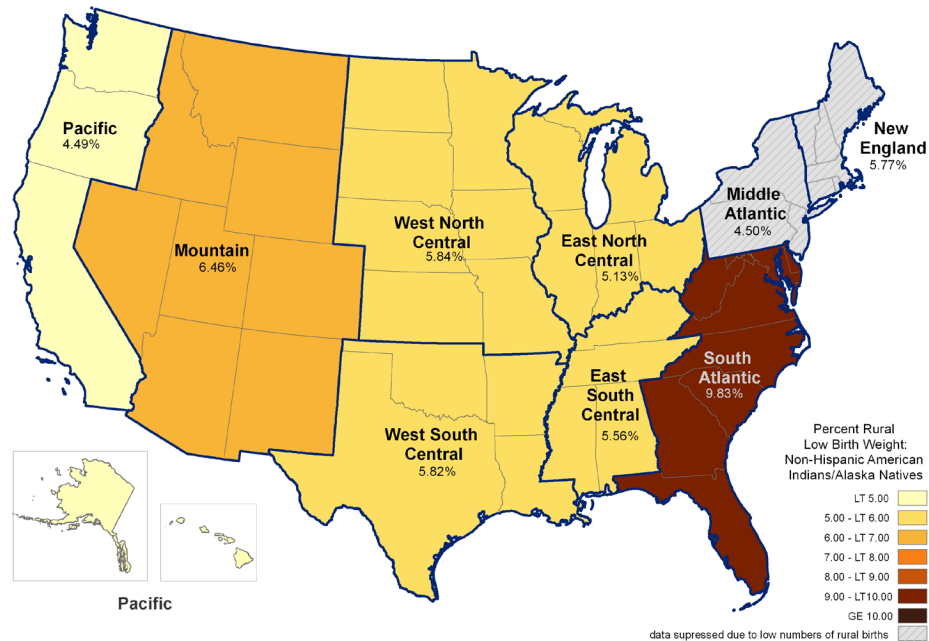
**Figure 3: Rural Low Birth Weight by Census Division for Non-Hispanic Blacks, 2005**



Map Date: June 2011  
Data Sources: 2003 Urban Influence Codes, ERS, USDA;  
2005 period linked birth/infant death data file, NCHS, CDC

2005 national overall (urban and rural) low birth weight rate was 6.43%.

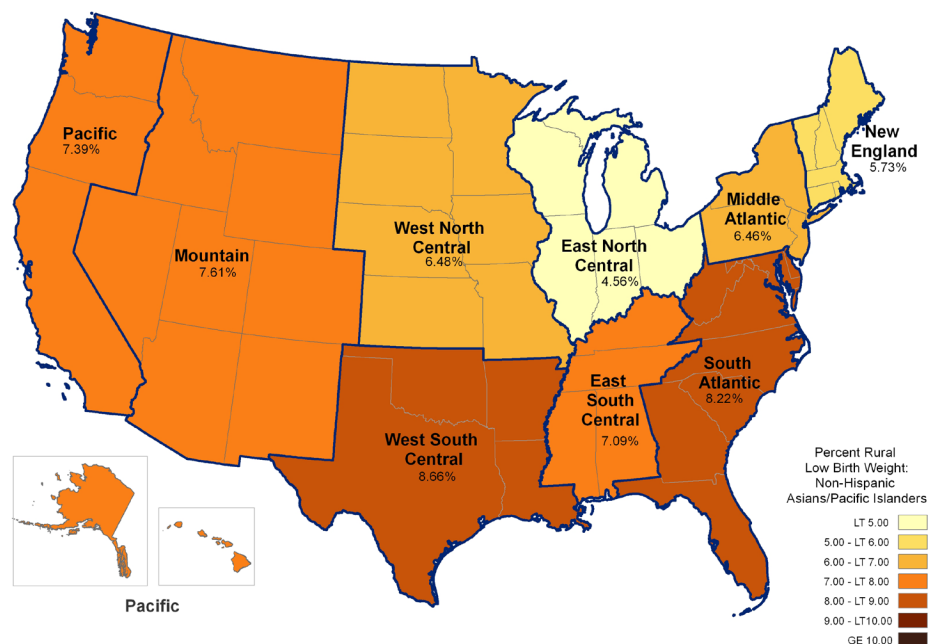
**Figure 4: Rural Low Birth Weight by Census Division for Non-Hispanic American Indians/Alaska Natives, 2005**



Map Date: June 2011  
Data Sources: 2003 Urban Influence Codes, ERS, USDA;  
2005 period linked birth/infant death data file, NCHS, CDC

2005 national overall (urban and rural) low birth weight rate was 6.43%.

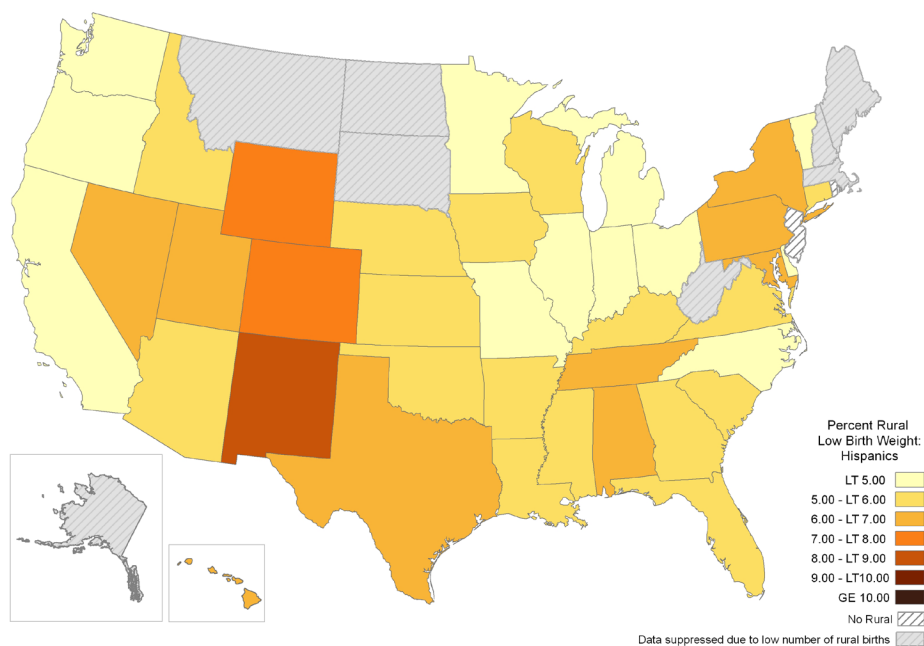
**Figure 5: Rural Low Birth Weight by Census Division for Non-Hispanic Asians/Pacific Islanders, 2005**



Map Date: June 2011  
Data Sources: 2003 Urban Influence Codes, ERS, USDA;  
2005 period linked birth/infant death data file, NCHS, CDC

2005 national overall (urban and rural) low birth weight rate was 6.43%.

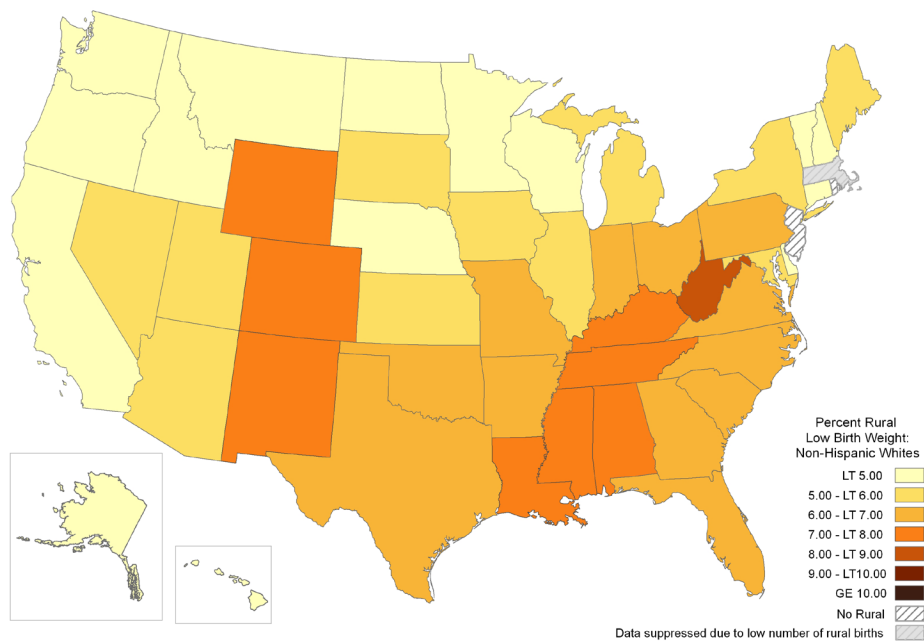
**Figure 6: Rural Low Birth Weight by State for Hispanics, 2005**



Map Date: June 2011  
Data Sources: 2003 Urban Influence Codes, ERS, USDA;  
2005 period linked birth/infant death data file, NCHS, CDC

2005 national overall (urban and rural) low birth weight rate was 6.43%.

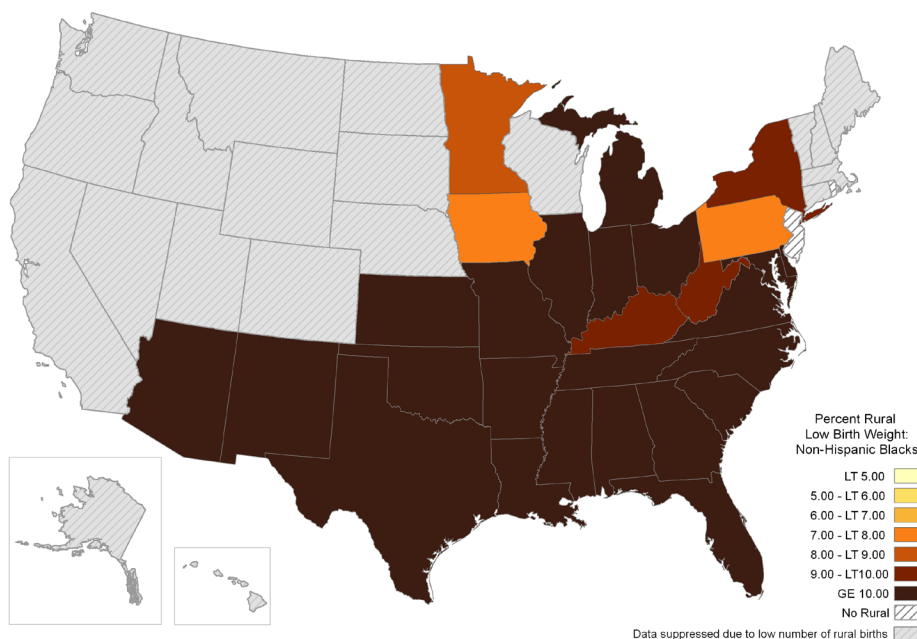
**Figure 7: Rural Low Birth Weight by State for Non-Hispanic Whites, 2005**



Map Date: June 2011  
Data Sources: 2003 Urban Influence Codes, ERS, USDA;  
2005 period linked birth/infant death data file, NCHS, CDC

2005 national overall (urban and rural) low birth weight rate was 6.43%.

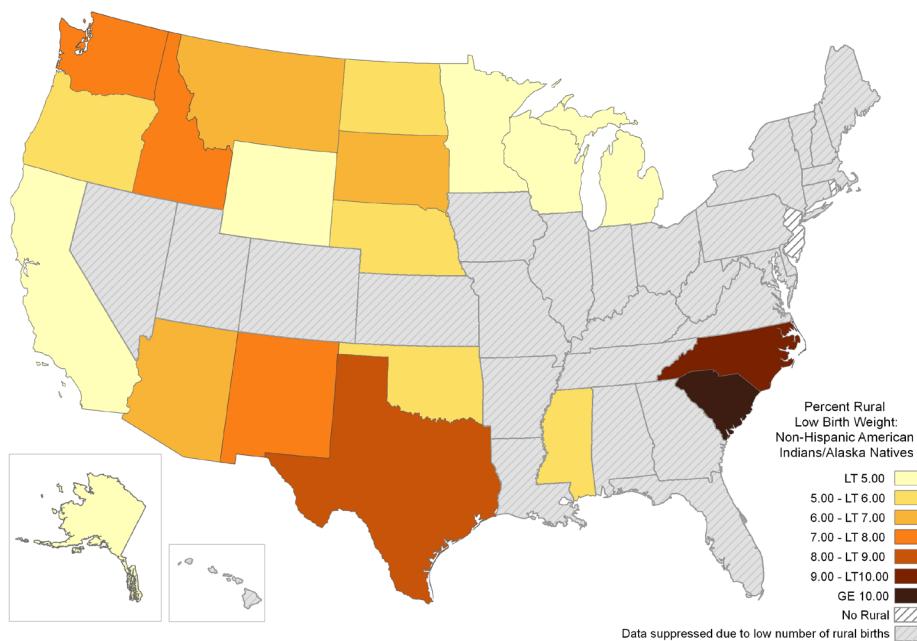
**Figure 8: Rural Low Birth Weight by State for Non-Hispanic Blacks, 2005**



Map Date: June 2011  
Data Sources: 2003 Urban Influence Codes, ERS, USDA;  
2005 period linked birth/infant death data file, NCHS, CDC

2005 national overall (urban and rural) low birth weight rate was 6.43%.

**Figure 9: Rural Low Birth Weight by State for Non-Hispanic American Indians/Alaska Natives, 2005**

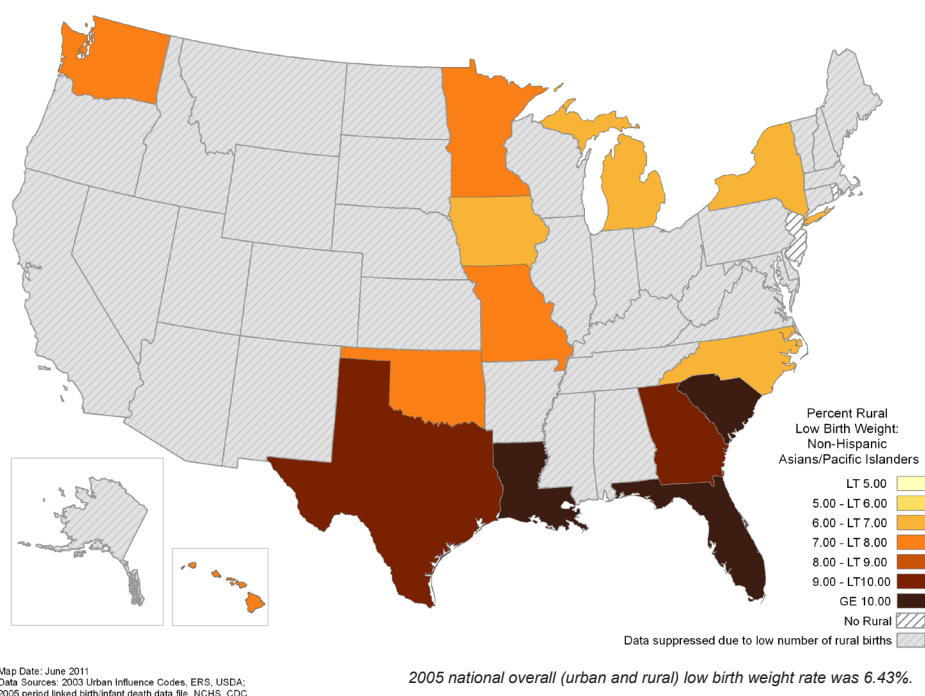


Map Date: June 2011  
Data Sources: 2003 Urban Influence Codes, ERS, USDA;  
2005 period linked birth/infant death data file, NCHS, CDC

2005 national overall (urban and rural) low birth weight rate was 6.43%.



**Figure 10: Rural Low Birth Weight by State for Non-Hispanic Asians/Pacific Islanders, 2005**



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1. Baldwin L-M, Fordyce MA, Andrilla CHA, Doescher MP. *Low Birth Weight Rates in the Rural United States, 2005*. Policy Brief #138 in the series *Perinatal Health in the Rural United States, 2005*. Seattle, WA: WWAMI Rural Health Research Center, University of Washington; 2013.
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## APPENDIX 1: Technical Documentation

### DATA FILE

These studies used the 2005 Period Linked Birth/Infant Death Data Set with county identifiers, obtained from the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics (NCHS), Hyattsville, Maryland.

### CASE SELECTION

These studies included only the 3,998,753 singleton births to mothers residing in the United States. This represented 96.5% of the 4,145,883 total births in the 2005 Period Linked Birth/Infant Death Data Set.

### RELIABILITY OF ESTIMATES

We have suppressed the results for any state if they did not meet criteria for ensuring their reliability (see Figures 3, 4, 6-10 and Appendices 2 and 3). First, we calculated relative standard errors (RSEs) and suppressed the results for census divisions or states with an RSE of greater than 30%. Second, we suppressed the results for census divisions or states with less than 30 observations (e.g., a total of 19 rural births within a state) or a numerator of less than 5 (e.g., a total of 3 rural births with inadequate prenatal care within a state).

### DESIGNATION OF RURAL COUNTIES

We used the 2003 Urban Influence Codes (UIC) developed at the Economic Research Service, USDA,\* to identify non-metropolitan (referred to as rural) counties (UIC = 3-12). Rhode Island, New Jersey, and the District of Columbia had no rural counties and therefore have no data represented on the maps.

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\* U.S. Department of Agriculture, Economic Research Service. Briefing rooms: Measuring rurality: Urban Influence Codes. <http://webarchives.cdlib.org/sw15d8pg7m/http://ers.usda.gov/Briefing/Rurality/UrbanInf/>. Accessed October 7, 2013.

## APPENDIX 2:

### Percent Rural Low Birth Weight Rates by Race/Ethnicity and Census Division, 2005

Census Division	Total Rural Births	% Rural LBW
<b>Hispanic</b>		
New England	465	4.52
Mid Atlantic	1,524	6.96
East North Central	4,731	4.78
West North Central	7,529	5.19
South Atlantic	12,154	5.27
East South Central	3,598	6.14
West South Central	21,249	6.47
Mountain	13,282	7.11
Pacific	7,079	4.92
NATIONAL	71,611	5.97
<b>Non-Hispanic white</b>		
New England	16,201	5.17
Mid Atlantic	33,882	5.89
East North Central	91,866	5.71
West North Central	71,351	5.16
South Atlantic	70,179	6.67
East South Central	59,716	7.31
West South Central	51,243	6.71
Mountain	33,924	5.94
Pacific	22,030	4.33
NATIONAL	450,392	6.04
<b>Non-Hispanic black</b>		
New England	~	~
Mid Atlantic	789	8.24
East North Central	1,498	13.68
West North Central	1,779	10.29
South Atlantic	25,464	13.43
East South Central	16,966	13.16
West South Central	12,090	14.18
Mountain	395	10.63
Pacific	251	7.17
NATIONAL	59,361*	13.29*
<b>Non-Hispanic American Indian/Alaska Native</b>		
New England	~	~
Mid Atlantic	~	~
East North Central	995	5.13
West North Central	3,439	5.84
South Atlantic	1,434	9.83
East South Central	396	5.56
West South Central	3,367	5.82
Mountain	6,250	6.46
Pacific	2,831	4.49
NATIONAL	19,016†	6.08†
<b>Non-Hispanic Asian/Pacific Islander</b>		
New England	279	5.73
Mid Atlantic	356	6.46
East North Central	790	4.56
West North Central	910	6.48
South Atlantic	1,010	8.22
East South Central	437	7.09
West South Central	681	8.66
Mountain	539	7.61
Pacific	3,152	7.39
NATIONAL	8,154	7.13
<b>National</b>	<b>608,534</b>	<b>6.76</b>

~ = insufficient data.

\* = includes data from New England.

† = includes data from New England and Mid Atlantic.

Includes only singleton births to U.S. residents.

Geographic location is based on mother's state of residence.

3,520 rural births were excluded due to missing birth weight information and/or race/ethnicity.

# APPENDIX 3:

## Rural Low Birth Weight Rates by Race/Ethnicity and State, 2005

State	Hispanic		Non-Hispanic White		Non-Hispanic Black		Non-Hispanic AI/AN		Non-Hispanic Asian/PI	
	Total Rural Births	% Rural LBW	Total Rural Births	% Rural LBW	Total Rural Births	% Rural LBW	Total Rural Births	% Rural LBW	Total Rural Births	% Rural LBW
Alabama	1,491	6.64	10,769	7.15	4,067	12.15	~	~	~	~
Alaska	~	~	1,436	3.27	~	~	1,646	3.65	~	~
Arizona	2,639	5.95	3,918	5.59	100	11.00	2,499	6.60	~	~
Arkansas	1,096	5.93	10,521	6.80	2,727	13.24	~	~	~	~
California	2,100	4.95	5,976	4.38	~	~	462	4.98	~	~
Colorado	2,560	7.93	5,135	7.44	~	~	~	~	~	~
Connecticut	270	5.19	2,554	4.89	~	~	~	~	~	~
Delaware	507	3.35	1,215	4.86	429	11.66	~	~	~	~
District of Columbia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Florida	2,316	5.74	8,180	6.42	1,744	12.61	~	~	121	11.57
Georgia	2,675	5.53	14,510	6.40	7,472	14.17	~	~	206	9.22
Hawaii	926	6.91	1,337	4.04	~	~	~	~	2,480	7.94
Idaho	1,376	5.23	6,017	4.87	~	~	151	7.95	~	~
Illinois	863	4.75	16,885	5.76	669	14.35	~	~	~	~
Indiana	1,198	4.67	16,257	6.17	206	13.11	~	~	~	~
Iowa	1,281	5.39	14,051	5.29	190	7.89	~	~	189	6.88
Kansas	2,423	5.49	10,185	5.42	409	11.74	~	~	~	~
Kentucky	428	5.84	20,955	7.68	643	9.95	~	~	~	~
Louisiana	299	5.02	9,417	7.91	5,822	14.82	~	~	139	10.79
Maine	~	~	5,136	5.94	~	~	~	~	~	~
Maryland	212	6.13	2,642	5.03	542	12.55	~	~	~	~
Massachusetts	~	~	~	~	~	~	~	~	~	~
Michigan	1,030	4.56	17,337	5.07	160	12.50	390	4.36	160	6.88
Minnesota	1,263	4.67	14,532	4.23	225	8.89	682	4.55	220	7.73
Mississippi	620	5.00	11,082	7.21	10,949	13.67	254	5.91	~	~
Missouri	754	4.77	17,715	6.15	823	11.30	~	~	162	7.41
Montana	~	~	5,627	4.99	~	~	1,120	6.61	~	~
Nebraska	1,581	5.25	7,626	4.47	~	~	260	5.00	~	~
Nevada	615	6.02	2,119	5.05	~	~	~	~	~	~
New Hampshire	~	~	4,363	4.95	~	~	~	~	~	~
New Jersey	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
New Mexico	4,908	8.13	2,995	7.18	172	11.05	1,631	7.17	~	~
New York	738	6.91	15,002	5.65	389	9.51	~	~	188	6.91
North Carolina	4,464	4.82	19,793	6.61	7,428	13.09	1,242	9.66	359	6.13
North Dakota	~	~	3,126	4.22	~	~	745	5.50	~	~
Ohio	774	4.52	26,115	6.32	397	14.61	~	~	~	~
Oklahoma	1,448	5.73	11,901	6.65	585	13.68	3,088	5.57	203	7.88
Oregon	1,661	4.70	7,044	4.70	~	~	351	5.41	~	~
Pennsylvania	786	7.00	18,880	6.09	400	7.00	~	~	~	~
Rhode Island	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
South Carolina	1,234	5.83	6,318	6.96	5,624	13.94	68	17.65	118	10.17
South Dakota	~	~	4,116	5.13	~	~	1,450	6.28	~	~
Tennessee	1,059	6.23	16,910	7.03	1,307	13.54	~	~	~	~
Texas	18,406	6.58	19,404	6.11	2,956	13.87	127	8.66	233	9.87
Utah	438	6.39	4,231	5.53	~	~	~	~	~	~
Vermont	47	0.00	3,878	4.72	~	~	~	~	~	~
Virginia	697	5.88	8,816	6.53	1,984	12.25	~	~	~	~
Washington	2,212	4.34	6,237	4.18	~	~	354	7.06	214	7.01
West Virginia	~	~	8,705	8.19	241	9.54	~	~	~	~
Wisconsin	866	5.43	15,272	4.83	~	~	508	4.92	~	~
Wyoming	532	7.33	3,882	7.29	~	~	282	3.90	~	~

~ = insufficient data.

N/A = not applicable because of no rural births.

Includes only singleton births to U.S. residents.

Geographic location is based on mother's state of residence.

Rural births with missing birth weight information and/or ethnicity were excluded.